Newsletter on Computational and Applied Mathematics

Editors:
P. Dierckx, R. Piessens
Dept. Computer Science, K.U. Leuven
Celestijnenlaan 200A, B-3001 Leuven(Heverlee)
Belgium

Published by:
Elsevier Science B.V.
North-Holland

Vol. 13, nr. 3, November 1997

Contact person for:
Australia: I.H.Sloan, Math. Dept., Un. New South Wales, Kensington NSW 2033
Austria: R.Burkard, Inst. Math., Techn. Un. Graz, Kopernikusgasse 24, 8010 Graz
China: R-H Wang, Inst. of Appl. Math., Dalian Un. of Technology, Dalian 116024
Denmark: S.Christiansen, Inst. of Math. Modelling, Bldg. 305, Techn. Un. Denmark, 2800 Lyngby
Egypt: M.B.Abd-el-Malek, Am. Un. In Cairo, P.O. Box 2511, Cairo
Finland: O.Nevanlinna, Inst. Math., Helsinki Un. Techn., 2150 Espoo 15
France: C.Brezinski, UER IEEA, Un. Lille I, 59655 Villeneuve d'Ascq CEDEX
Germany: H.Arndt, Inst. Ang. Math., Un. Bonn, Wegelerstrasse 6, 53115 Bonn 1
Greece: S.Galanis, Dept. Math., Un. Ioannina, 451 10 Ioannina
India: M.M.Chawla, Dept. Maths, Kuwait Un., P.O. Box 5969, Safat 13060, Kuwait
Iran: G.Dargahi, Dept. Math., Iran Un. Sc. Techn., Narmak, Tehran 16
Israel: I.M.Longman, Dept. Geoph. Plan. Sc., Tel Aviv Un., Ramat Aviv
Italy: B.Gabutti, Inst. Calcoli Num., Un. Torino, Via C. Alberto 10, 10123 Torino
Japan: N.Yamamoto, Graduate School Maths, Kyushu Un. 33, Fukuoka, 812-81
Norway: T.Lyche, Inst. Inf., Un. Oslo, P.B. 1080, Blindern, Oslo 3
Portugal: F.A. Olivereira, Dept. Math., Un. Coimbra, Apartado 3008, 3000 Coimbra
Slovenia: J.Kozak, Dept. Math. and Mech., Un. Ljubljana, Jadranska 19, 61111 Ljubljana
Switzerland: M.Gutknecht, Sem. Ang. Math., ETH-Zentrum, Hauptgebäude, 8092 Zürich
The Netherlands: P.van der Houwen, C. Wisk. Inf., Math. Centr., P.B. 94079, 1090 GB Amsterdam
United Kingdom: D.R.Emerson, Daresbury Lab., Keckwick Lane, Daresbury, Warrington WA4 4AD

Aims and scope:
The CAM-newsletter is a newsletter intended for numerical analysts and applied mathematicians. Topics included are book reviews, announcements and reports of conferences outside the U.S.A., titles of institutional reports and available numerical software.
The contact persons will collect and pass the announcements of events taking place in their country. Institutions interested to insert in the newsletter the titles of their recent reports are kindly invited to send such information to the editors. Authors who are willing to distribute their numerical software for research purposes may use the column "available software". They should send a note to the editors containing a brief description of their programs and practical information for a potential user. Also bibliographies on special purpose software may be published in this column.

Contributions to the next issue should be sent to the editors before January 10, 1998.

1 Book reviews

Parallel Numerical Algorithms
David E. Keyes, Ahmed Sameh, and V. Venkatakrishnam (eds)
Kluwer Academic Publishers, Dordrecht, 1997, ISBN 0-7923-4282-8, 408 pages, Hardcover USD 195.

This book arose out of a Workshop on Parallel Numerical Algorithms, hosted by the Institute for Computer Applications in Science and Engineering (ICASE), and the NASA Langley Research Center, in Hampton, Virgina, USA, May 23-25, 1994. It is the fourth volume in the ICASE/LaRC Interdisciplinary Series in Science and Engineering.

In this volume, leading representatives from major algorithmic areas of large-scale scientific computing survey their fields, with an emphasis on parallelism. In an introductory note, editor David Keyes characterises the field of parallel numerical algorithms as "scientific computing in the presence of nonuniform memory access". It requires inputs from both numerical analysis and computer science. He rightly states that in the high performance computing business "memory references have replaced floating point operations as the prime concern" and that "the three most important criteria in selecting an algorithm for high performance computing are: (1) data locality, (2) data locality, and (3) data locality" !

The book starts off with three articles on direct and iterative parallel linear systems solvers, and one paper on implicitly restarted Arnoldi/Lanczos methods for large-scale eigenvalue computations. Part two deals with preconditioning techniques and covers approximate and incomplete factorizations, as well as methods more directly rooted in partial differential equations, i.e., multi-level and domain decomposition methods. Part three concerns algorithms motivated by specialized transformations of the PDEs or their corresponding integral forms: FFTs, multiresolution methods, and multipole methods. Techniques for working in the parallel environment – partitioning, performance debugging, and benchmarking – are the subjects of the final three chapters, part four of the book.

This book contains a unique collection of well-written survey articles, covering the state-of-the-art in the rapidly evolving field of parallel numerical algorithms. Highly recommended !

S. Vandewalle

Numerical Methods and Software Tools in Industrial Mathematics
Morten Daehlen, and Aslak Tveito (eds)
Birkhäuser, Berlin, 1997, ISBN 3-7643-3973-X, 405 pages, Hardcover DM 148.

Scientific computing has become a discipline of major importance in science and engineering. Today, computational problems of extreme complexity can be solved. However, the difficulty of implementation and maintenance, and the poor availability of reliable scientific software are limiting factors to the widespread use of numerical computation and simulation in industrial applications. This book discusses how modern software concepts in computer science can be applied in order to develop scientific software that is easier to extend, maintain and use than their traditional counterparts.
This books contains 19 refereed articles, that present the main results from research programs granted by the Research Council of Norway for the period 1992 to 1996. These research programs have been carried out in close collaboration between the Department of Mathematics and the Department of Informatics at the University of Oslo, and SINTEF Applied Mathematics, which is a private research institute.
The book is separated into three parts. Part I, on *numerical software tools*, is concerned with the use of object-oriented programming techniques for numerical applications. It focusses in particular on the use of C++. Part II deals with *partial differential equations*, and contains eight papers ranging from the modelling of physical phenomena to efficient solvers for algebraic equations arising from the discretization of partial differential equations. Finally, Part III is devoted to *geometric modelling*, with articles ranging from scattered data approximation to intersection of manifolds. Both Part II and Part III are closely linked to the first part of the book, i.e., the software packages and software development techniques described in

Part I are extensively used later on in the book in order to solve various problems.
The book is an interesting survey of recent developments in software tools for a broad scientific and engineering readership.

S. Vandewalle

Maximum Entropy and Bayesian Methods
Kenneth M. Hanson and Richard N. Silver (eds.)
Fundamental Theories of Physics
Kluwer Academic Publishers 79, Dordrecht, 1996, ISBN 0-7923-4311-5, 480 pages, Hardbound USD 215.

This book contains the proceedings of the Fifteenth International Workshop on Maximum Entropy and Bayesian Methods. Both topics are actually quite popular in several domains where statistical data analysis comes in. Bayesian statistical methods try to incorporate additional knowledge in a prior model for the parameters to estimate. The principle of Maximum Entropy (MaxEnt) states that in problems of modelling random variables, this model should be chosen such that the "entropy" is as large as possible under the given external knowledge. A good definition of the entropy concept then finds a model that introduces no extra "information" while containing consistency with the given knowledge.
The volume contains fifty-seven papers, some of which have a more theoretical character, whereas others describe links to application domains. The more fundamental papers include the information theoretical approach, Time Series models and analysis, a confrontation of the bootstrap procedure with Bayesian models, many parameter estimation problems, learning and neural networks, and elements of statistical physics. Also, extensions and problems of the classical Bayesian inference and the MaxEnt principle are discussed. Applications include general image analysis and processing, tomography, financial option theory, biological studies, fluid dynamics, and many signal processing problems.
Because of this broad spectrum of applications, this volume will be of interest to many readers. The book also mentions a list of presentations without text in the proceedings. Among these we have a general introduction to Bayesian methods and the MaxEnt principle. Because of the wide range of applications and the possible interest of people from several fields, it would have been interesting if such an introduction appeared in this proceedings.

M. Jansen

Nonlinear Dynamical Systems and Chaos
H. Broer, S. Van Gils, I. Hoveyn and F. Takens (eds.)
Birkhaüser Verlag, 1995, ISBN 3-7643-5346-5, 466 pages, Hardcover DM 198.

These proceedings of a conference held in Groningen, the Netherlands, in December 1995 are published as Volume 19 of the series 'Progress in Nonlinear Differential Equations and Their Applications'.

The papers are organized in several sections:

- Symmetries in dynamical systems (8 papers).
- KAM theory and other perturbation theories (6 papers).
- Infinite dimensional systems (4 papers).
- Time series analysis (1 paper).
- Numerical continuation and bifurcation analysis (2 papers).

The papers are of high quality and are on average 22 pages long. This is an interesting book for researchers in the field.

D. Roose

High Performance Computing in Fluid Dynamics
P. Wesseling (ed.)
Kluwer Academic Publishers, 1996, ISBN 0-7923-4063-9, 278 pages, Hardcover USD 124.

This book contains the course notes of a Summer school on High Performance Computing in Fluid Dynamics, held at the T.U. Delft, The Netherlands in June 1996. This is the third volume

in the ERCOFTAC (European Research Community on Flow, Turbulence and Combustion) series of Kluwer.
The book consists of eight chapters (30-40 pages each), written by different authors (D. Emerson, C. Lacor, P. Amestoy and M. Daydé, M. Streng, H. Van der Vorst, F.-S. Lien, R. Verstappen and A. Veldman, P. Michielse). The topics discussed include: basic concepts of parallel computers, evolution of parallel architectures, parallelisation strategies, load balancing, programming aspects, parallel algorithms, applications in computational fluid dynamics. Concerning parallel algorithms, not only algorithmic and implementation issues are discussed, but also mathematical aspects of numerical methods for large scale problems such as domain decomposition, Krylov iterative methods, etc.
The book aims at students at graduate level and researchers engaged in scientific computing. Most of the authors have a strong background in CFD and the book gives a good overview of the important issues in parallel and high performance computing for this application field. I would not recommend this book as a general introduction to parallel computing, but it is a good textbook for application programmers who need a concise and straightforward introduction to high performance computing.

D. Roose

The Control Handbook
William S. Levine (ed.)

CRC Press in cooperation with IEEE Press, 1996, ISBN 0-8493-8570-9, 1548 pages, Harcover DM 268.

This voluminous work is an up to date encyclopaedia covering the present field of control theory and practice. The book consists of 80 papers that were written by 174 authors, many of which are world renown specialists on the topic they present here. Each contribution is a survey paper of moderate length on a more or less "narrow" subject. The idea is that, whatever you would like to know something about a topic related to control, there should be at least one paper in this book where you can find it or an appropriate reference to the literature. Therefore, the extensive index at the end of the book is really essential. When used as such, the book can be seen as a dictionary. This impression is emphasized by the fact that quite often a paper ends with a glossary, called "Defining Terms", which gives brief definitions of notions used in the text.
On the other hand, the survey papers can be read almost independently. Thus, the handbook can also be used by someone who wants to learn about the subject. He is offered a wide variety of easily accessible surveys, and also most of the preliminaries he would need are provided. But, control engineering being a topic with many diverse subdomains, this book can also be used by the more experienced reader, who can find out about the state-of-the-art in a certain subfield he might be not so familiar with.
The contributions are subdivided into three parts: Fundamentals, Advanced topics, and Applications.
The Fundamentals include the necessary mathematics (linear algebra, complex variables,...), linear and nonlinear systems, and the theory and software description for the most common elementary control problems.
The Advanced topics, deal with more difficult problems. It is the core of the handbook and is also the most extensive part. For example multi-input multi-output systems are dealt with here because it requires more advanced mathematical tools. Also subjects like nonlinear, stochastic, and adaptive control, and control of distributed parameter systems can be found here.
The Applications part contains examples from process control, mechanical control, and electronic and electrical control. These are certainly the most classical applications, but there is also a contribution about "Human-in-loop control". These applications are in my opinion not just case studies, but they really show the theory and algorithms at work. There has been a traditional gap in control theory between the purely theoretical researchers, and the field-workers. These examples show that the theory can be applied, but also that certain aspects are not always covered by the theory. For example certain cost and complexity arguments, fail-safe guarantees and certain ad-hoc decisions that have to be made, are not always described by hard mathematics.

This handbook is an encyclopedic work that belongs in a library, but I am certain that specialists and non-specialists alike will often consult it when they have it on their shelf in the office.

A. Bultheel

Topics in Interpolation Theory
H. Dym, B. Fritzsche, V. Katsnelson, and B. Kirstein (eds.)
Operator Theory Advances and Applications 95, Birkhäuser Verlag, Basel, 1997, ISBN 3-7643-5723-1, 516 pages, Harcover DM 188.

About half of the papers in this book are based upon lectures that were held at the Leipzig conference in 1994, which was dedicated to V.P. Potapov. In addition, some historical comments, several translations of important papers related to Potapov's work, and two expository papers especially written for this volume were included.
Potapov (1914–1980) has initiated the study of J-contractive matrix valued functions. J is here a signature matrix and J-contractive means $A^*JA \leq J$ in some region of the complex plane like for example the unit disk. These matrices appear in many theoretical and applied problems and they play an important role in the field of so called "Schur analysis". Leipzig is one of the most renown centers in the world for this kind of research.
We mention that in an earlier issue of this Newsletter, we reviewed *Matrix and Operator Valued Functions*, edited by I. Gohberg and L.A. Sakhnovich, which appeared in 1995 as volume 72 in the same book series. This was also a tribute to Potapov containing historical reminiscences and mathematical contributions, just like the present volume.
As for the mathematical content, of course the papers deal with different aspects of the Potapov theory. A central issue, treated in several papers, is for example the factorisation of a J-contractive matrix as a product of elementary matrices. This factorisation is fundamental and has important implications for the implementation of several interpolation algorithms, for realization theory when J-contractive matrices are applied to circuits and many other instances.
A technique frequently used by Potapov is to reformulate a certain problem (for example a constrained interpolation problem) as a matrix inequality problem. Several papers in this volume apply this technique for matrix extensions of Nevanlinna-Pick interpolation and related problems.
An important subclass of J-contractive matrices are the J-inner matrices, which are analytic and contractive in a domain and unitary on the boundary. This has applications in canonical systems of differential equations. Also this aspect is treated in several papers of this book. One of these is the translation of a paper co-authored by Potapov.
Two other aspects which regularly return in several papers are interpolation problems and spaces with an indefinite metric. Far reaching generalizations of classical interpolation problems in complex analysis like for example the Nevanlinna-Pick interpolation problem are extensively discussed. In such classical interpolation problems, the solutions have to be analytic in some region, which relates to a positive definite moment matrix. If the solutions are allowed to have a number of poles in the region of interest, then the associated moment matrix will have a number of negative eigenvalues. This gives rise to indefinite metric spaces. A classical example is the Nehari problem.
The material added to the usual proceedings papers give this book an extra value.

A. Bultheel

Numerical Analysis, an Introduction
W. Gautschi
Birkhäuser Verlag, Boston-Basel-Berlin, 1997, ISBN 3-7643-3895-4, 516 pages, Hardcover DM 118.

The book is a collection of elementary chapters and some more advanced ones. The introduction material includes machine arithmetic, approximation and interpolation of functions, numerical differentiation and integration, and the solution of nonlinear equations. The numerical solution of initial value and two-point boundary value problems for ODEs is somewhat more advanced. It is the author's opinion that numerical linear algebra and the solution of PDEs deserve a course of

their own, and these topics are not included.
The material is treated in a rather classical way with no real surprises, so we can restrict ourselves to sketching the flavour of the presentation. A first observation is that Gautschi has restricted the material to pure numerical analysis and that extensive numerical examples and applied problems are not included. However, there is, besides a long list of theoretical exercises, also a set of machine assignments included after each chapter. They stimulate the student to experiment with the methods he has learned. Another observation is that the main text is restricted to the essentials of the analysis and for deeper or more advanced reading, the student should consult the notes at the end of the chapter where a survey of the literature is given together with some historical remarks. As a consequence of these options, the text is lightly digestible and easy to read and assimilate. The biographical footnotes about mathematicians who gave their name to a theorem, a formula, or a method are a pleasant interruption of the mathematics.
To conclude, this book contains lecture notes for a course in numerical analysis which can be classified among the better ones with a traditional approach to the subject. There are however no radical new views on how the subject should be taught. It follows a tradition, which is the culmination of the experience built up by the author who has been teaching this material over a period of 30 years.

A. Bultheel

2 Conferences

14th GAMM-Seminar Kiel on CONCEPTS OF NUMERICAL SOFTWARE

Date: 23–25 January, 1998.

Location: Kiel, Germany.

Organizers:
Wolfgang Hackbusch (Kiel), Gabriel Wittum (Stuttgart).

Invited speakers: P. Bastian (Stuttgart), C. Lage (Zürich).

Topics:
- Concepts of software development in general for
  - partial differential equations,
  - integral equations,
  - grid generation,
  - graphical postprocessing, etc.
- Design and Modelling of numerical software,
- Implementation aspects ; i.e.
  - parallelization and vectorization,
  - objectoriented realizations, etc.

Other information:
Contributers should send an abstract (10-20 lines) of their lecture by November 15, 1997. Notice of acceptance will be given by December 1, 1997. All participants, whether giving a talk or not, have the
The conference fee is DM 70, to be paid after arrival.

Contact address:
Jens Burmeister
Lehrstuhl Praktische Mathematik der
Christian–Albrechts–Universität Kiel
Hermann–Rodewald–Str. 3/1
D–24098 Kiel, Germany
Tel.: ++49-431-880-4462
Fax: ++49-431-880-4054
email: jb@numerik.uni-kiel.de
http://www.numerik.uni-kiel.de/gamm/

Seventh International Conference on HYPERBOLIC PROBLEMS

Date: 9–13 February 1998.

Location: ETH Zürich, Switzerland.

Other information: CAM-Newsletter 13, 2.

Contact address:
HYP-98, c/0 Seminar for Applied Mathematics
ETH Zentrum, CH-8092 Zürich, Switzerland
Tel.: +41-1-632 34 65
Fax: +41-1-631 10 85
email: hyp98@sam.math.ethz.ch
http://www.sam.math.ethz.ch/~hyp98/index.html

ISIP'98
International Symposium on
INVERSE PROBLEMS in ENGINEERING MECHANICS

Date: 24–27 March 1998.

Location: Nagano City, Japan.

Other information: CAM-Newsletter 13, nr. 2.

Contact address:
Prof. Masa Tanaka, Chair
Dept. of Mech. System Eng.
Fac. of Engineering, Shinshu Univ.
500 Wakasato, Nagano 380, Japan
Fax: +81-26-224-6515
email: dtanaka@gipwc.shinshu-u.sc.jp
http://homer.shinshu-u.ac.jp/ISIP98

MUNICH STOCHASTIC DAYS

Date: 24–27 March 1998.

Location: Munich, Germany.

Other information: CAM-Newslettter 13, nr. 2.

Contact address:
Muenchener Stochastik-Tage 1998
Univ. Prof. Dr. K. Marti
UniBw Muenchen, Fak. LRT
D-85577 Neubiberg/Muenchen, Germany
email: stoch.tage.98@unibw-muenchen.de
http://www.unibw-muenchen.de/campus/LRT/LRT1/stoch_98

Third Conference on
REAL NUMBERS and COMPUTERS

Date: 27–29 April, 1998.

Location: Paris, France.

Aim and Scope:
Efficient handling of real numbers in a computer is not yet solved in a satisfying way. The "floating point" formats most often used in scientific computing usually give sufficient results, but some reliability problems can occur. Program portability problems could imply some rewriting costs: some programs which work well with a machine, could become unreliable with another one. Users (working on computer algebra, algorithmic geometry) may need far more accurate results (even "exact results") than the ones obtained with usual number systems. Many members of the scientific community are concerned by this problem, they could share their knowledge and come up with solutions. But they do not have the opportunity to meet, they do not belong to the same scientific fields (computer science, number theory, numerical analysis, computer algebra) and they have a different vocabulary. The aim is to put them together during this meeting (the "rule of the game" should be that everybody should speak a common language), in order to establish some collaborations.

Topics:
- Algorithms and architectures for "serial" and "on line" arithmetic.
- Relations between number theory, automata theory and computer arithmetic.
- Number systems.
- Floating point arithmetic.
- Calculability.
- Symbolic manipulation of numbers.
- Algorithms for "exact" computing
- Multi-precision, interval arithmetic, stochastic arithmetic ...
- Accuracy problems in various fields (geometry, physics,...), and proposed solutions.

Other information:
The deadline for submission of manuscripts (not abstracts) is January 1st, 1998.

Contact address:
Jean-Marie Chesneaux
Laboratoire LIP6, Univ. Pierre et Marie Curie
4 place Jussieu, 75252 Paris Cedex 05, FRANCE
email: Jean-Marie.Chesneaux@lip6.fr
http://www-anp.lip6.fr/RNC3/

EUROBEM '98
Second European
BOUNDARY ELEMENT METHOD
Symposium

Date: 19–21 May, 1998.

Location: Southampton, England.

Organizer: Wessex Institute of Technology.

Sponsor: International Society for Boundary Elements (ISBE).

Topics:

- Stress Analysis Application
- Fluid Flow
- Acoustics
- Non-linear Material Problems
- Electrostatics
- Electromagnetics
- Vibrations and Dynamics
- Thermal Problems
- Geomechanics
- Research in Progress at Eur. BEM Centres
- BEM Software
- Mathematical and Computational Aspects.

Other information:

Three copies of an abstract of no more than 300 words (if submitting by post), clearly stating the purpose, results and conclusion of the work to be described in the final paper should be submitted to the Secretariat before 1 December, 1997.
The proceedings of EUROBEM 98 will be published to a high standard by Computational Mechanics.

Contact address:

Liz Kerr
Conference Secretariat - EUROBEM 98
Wessex Institute of Technology
Ashurst Lodge, Ashurst
Southampton, SO40 7AA, UK
Tel.: 44 (0) 1703 293223
Fax: 44 (0) 1703 292853
email: liz@wessex.ac.uk
http://www.wessex.ac.uk

International Conference on Partial Differential Equations and Numerical Analysis

Date: 15–19 June, 1998.

Location: Beijing, China.

Organizers:

- Inst. of Appl. Maths, Academia Sinica, China.
- Liu Bie Ju Centre for Math. Sciences, City Un. Hong Kong.

Aim and Scope:

This conference is to provide a forum for mathematical scientists to present their latest research on various areas, and aims to bring senior scientists and young researchers together for personal interaction and dialogue.

Invited speakers:

F. Brezzi (Pavia, Italy), G.Q. Chen (Northwestern Un., USA), D.T. Li (Fudan Un., China), Q. Lin (Inst. of Systems Science, China), T.P. Liu (Stanford Un., USA), S.A. Orszag (Princeton Un., USA), A. Smoller (Un. of Michigan, USA), O.B. Widlund (New York Un., USA).

Topics:

- Partial Differential Equations
- Mathematical Physics
- Numerical Analysis
- Scientific and Engineering Computation

Other information:

The program will consist of one-hour plenary talks, half-hour invited talks and 20-minute contributed talks. Title and abstracts of contributed papers must be received by 1 March, 1998.
The registration fee is 250 USD.

Contact address:

Dr. Feimin Huang
Institute of Applied Mathematics
Academia Sinica, Beijing 100080, China
email: dingx@amath6.amt.ac.cn
http://www.cityu.edu.hk/ma/

Fourth World Congress on Computational Mechanics

Date: 29 June – 2 July, 1998.

Location: Buenos Aires, Argentina.

Organizer:

IACM - International Association of Computational Mechanics.

Invited speakers:

J.H. Argyris (Un. Stuttgart, Germany), K.J. Bathe (Massachussets Inst., Technology, USA), C.A. Felippa (Un. Colorado at Boulder, USA), R.H. Gallagher (Clarkson Un., USA), T.J.R. Hughes (Stanford Un., USA), T. Kawai (Science Un. Tokyo, Japan), J.L. Lions (Centre Nat.

d'études Spatiales, France), T. Oden (Un. Texas at Austin, USA), O.C. Zienkiewicz (Un. College of Swansea, Wales).

Topics:

AI and Expert Systems, Mesh Generation and Refinement, Biomechanics, Metal Forming Processes, Computational Physics, Numerical Methods and Computing, CAD, CAM and CAE, Nonlinear Dynamics, Computational Fluid Mechanics, Parallel Computing, Electromagnetics, Process and Chemical Engineering, Environmental Science, Robotics and Control, Geomechanics, Solid and Structural Mechanics, Inverse Problems and Optimisation, Smart Algorithms and Adaptive, Mathematical Modeling Methods, Scientific Visualisation, Stochastic Mechanics, Material Science.

Contact address:

Argentina Ass. Comp. Mechanics (AMCA)
Güemes 3450, 3000 Santa Fe, Argentina
Tel.: (54) 42 - 55 66 73
Fax: (54) 42 - 55 09 44
email: rngtm@arcride.edu.ar
http://venus.unl.edu.ar/wccm.html

Second International Conference on BIFURCATION THEORY and its NUMERICAL ANALYSIS

Date: 29 June – 3 July, 1998.

Location: Xi'an, China.

Organizer: Xi'an Jiaotong University.

Aim and Scope:

The aim of this conference is to bring together active researchers with different backgrounds to discuss recent and prospective advances in the bifurcation theory and its numerical analysis.

Other information:

Prospective authors are invited to submit 500 word abstracts of their papers by February 1, 1998 at the address below.

Contact address:

Dr. Hou Yanren
Research Center for Applied Mathematics
Xi'an Jiaotong Un., Xi'an, 710049, P.R. China
email: ktli@xjtu.edu.cn

Fourth International Conference on OPTIMIZATION: TECHNIQUES and APPLICATIONS

Date: 1–3 July, 1998.

Location: Perth, Australia.

Aim and Scope:

The aim of the conference is to bring together researchers and practitioners in accounting, economics, engineering, management and science from Australia and overseas to exchange ideas and information on multi-disciplinary approaches to optimization.

Invited speakers:

Thomas Banks (North Carolina State Un., U.S.A), Antonio Cantoni (Curtin Un., Australia), Paul Frank (Boeing, U.S.A). George Leitman (UCLA, U.S.A). Paolo Toth (Un. Bologna, Italy).

Topics:

- Applications of Optimization Techniques in Engineering, Mining, Science, Economics, and Business
- Management
- AI/Neural Networks for Optimization
- Combinatorial/Integer Programming
- Control of Distributed Systems
- Decision Analysis
- Game Theory with Applications
- Global Optimization
- Linear and Non-linear Problems
- Large-Scale Optimization
- Location/Layout Problems
- Multi-criteria Optimization
- Network Optimization
- Optimal Control
- Optimal Design
- Scheduling/Sequencing
- Simulation and Optimization
- Stochastic Optimization
- Structural Optimization
- Transportation.

Other information:

The Conference will be preceded by a two-day tutorial workshop from June 29-30, 1998. This workshop comprises of six sessions presented by the following invited speakers :

- Thomas Banks (control and optimization)

- Paul Frank (large scale optimization)
- George Leitman (robust control).

In addition there will be a forum on operations research conducted by practitioners from industry.

Presented papers will be published in the proceedings of the Conference. A number of authors will be invited to submit expanded papers for consideration for publication in the Annals of Operations Research in a special issue on Optimization Theory and its Applications.

Contact address:
Dr. Y.H. Leung
A.T.R.I.
Curtin University of Technology
GPO Box U1987, Perth 6845, Australia
Tel.: +61 (8) 9266 3508
Fax: +61 (8) 9266 3244
email: leung@atri.curtin.edu.au
http://www.cs.curtin.edu.au/maths/icota98/

EURO XVI
European Conference on Operational Research

Date: 12–15 July, 1998.

Location: Brussels, Belgium.

Topics:
Applied probability, Combinatorial optimization, Global optimization, Integer programming, Interior point methods, Linear programming, Mathematical programming, Neural networks, Nonlinear programming, OR applications, Parallel computing, Software tools for OR, ...

Other information:
The deadline for submission of abstracts is December 15, 1997.

Contact address:
Jacques Teghem
MATHRO
Faculté Polytechnique de Mons
9, rue de Houdain, 7000 Mons, Belgium
Fax: +32-65-37 46 89
email: euro@mathro.fpms.ac.be
http://image.fpms.ac.be/euro16.html

8th International Congress on Computational and Applied Mathematics

Date: 27 July – 1 August, 1998.

Location: Leuven, Belgium.

Organizers: M. Goovaerts, L. Wuytack, R. Piessens, F. Broeckx.

Aim and Scope:
The congress will concentrate on the analysis and application of computational techniques for solving real scientific problems. There will be sessions on: parallel algorithms, constructive techniques for solving differential and integral equations, numerical quadrature, approximation, numerical complex analysis and conformal mapping, computational techniques in physics and chemistry, mathematical methods for financial and actuarial sciences.

Invited speakers:
Michael Griebel, Taketomo Mitsui, Lothar Reichel, Guido Vanden Berghe, Stefan Vandewalle, Piet Wesseling.

Contact address:
Prof. Marc Goovaerts, K.U.Leuven
Centrum voor Verzekeringswetenschappen
Minderbroederstraat 5, B-3000 Leuven Belgium
Tel.: (32) 16 32 37 43
Fax: (32) 16 32 37 40
email: fdbaa35@cc1.kuleuven.ac.be

PARTIAL DIFFERENTIAL EQUATIONS THEORY and NUMERICAL SOLUTIONS

Date: 10–16 August, 1998.

Location: Prague, Czech Republic.

Organizers:
Charles University, Praha and Ruprecht-Karls-Universität Heidelberg.

Topics:
- Multiple Scale Systems
- Conservation Laws
- Reactive Flow Problems, Diffusion, Transport
- Biffurcation Problems
- Qualitative Properties of Solutions to PDE - Regularity and Singularity

- Asymptotic Behavior
- Inverse Problems, Optimalization
- Image Analysis
- PDE and Applications
- Stochastic Systems
- Free Boundary Problems
- Compressible and Incompressible Fluid Flow
- Viscoelastic Flow
- Maxwell Equations, Electromagnetics and Acoustics
- Solid and Structural Mechanics
- Porous Media Flow and Sedimentation.

Contact address:
Jana Stara
KMA MFF UK
Sokolovska 83
18600 Praha 8, Czech Republic
email: pde98@karlin.mff.cuni.cz
http://kma14.karlin.mff.cuni.cz/pdeconf/firstann.html

ISSAC'98
International Symposium on Symbolic and Algebraic Computation

Date: 13-15 August, 1998.

Location: Rostock, Germany.

Sponsors:
Gesellschaft für Informatik (GI), in cooperation with ACM-SIGSAM.

Topics:

- **Algorithmic mathematics**
  Algebraic, symbolic, and symbolic-numeric algorithms including: simplification, polynomial and rational function manipulations, algebraic equations, summation, integration, linear algebra and matrix computations, number theory, ODE/PDE, complex computation, group computations, and geometric computing.
- **Computer science**
  Theoretical and practical problems in symbolic mathematical computation including: computer algebra systems, problem solving environments, programming languages and libraries for symbolic computation, user interfaces, data structures, software architectures, parallel/distributed computing, mapping algorithms to architectures, concrete analysis and benchmarking, complexity of computer algebra algorithms, artifical intelligence techniques, automatic differentiation and code generation, mathematical data exchange protocols.
- **Applications**
  Problem treatments incorporating algebraic, symbolic or symbolic-numeric computation in an essential or novel way, including engineering, economics and finance, physical and biological sciences, computer science, logic, mathematics, statistics, and use in education.

Other information:
The planned activities include invited presentations, research and survey papers, poster sessions, tutorial courses, vendor exhibits, and software demonstrations. Proceedings will be distributed at the symposium.

Contact address:
Volker Weispfenning
FMI, Universität Passau
D-94030 Passau, Germany
Tel.: (+49) 851-509-3120
Fax: (+49) 851-509-3122
email: issac98@alice.fmi.uni-passau.de
http://wwwteo.informatik.uni-rostock.de/ISSAC98/

4th International Conference on Mumerical Methods and Applications

Date: : 19–23 August, 1998.

Location: Sofia, Bulgaria.

Organizers:
The Bulgarian Academy of Sciences in cooperation with Sofia University and SIAM.

Aim and Scope:
A wide range of problems concerning recent achievements in numerical methods and their applications in mathematical modeling will be discussed.

Invited speakers:
O. Axelsson, J.H. Bramble, B.N. Chetverushkin, R.E. Ewing, R.P. Fedorenko, S. Godunov, P.

Hemker, U. Jaeckel, Z. Kamont, S.P Kurdyumov, Yu.A. Kuznetsov, R.D. Lazarov, H. Niederreiter, B. Philippe, Yu.P. Popov, I.V. Puzynin, S. Rjasanow, A.A. Samarskii, M. Schaefer, V. Thomee, P.N. Vabishchevich, H.A. van der Vorst, L. Xanthis, Z. Zlatev.

Other information:
The conference fee is 200 USD (if paid before May 31, 1998) and covers the Proceedings, the Conference Booklet and the Conference Dinner.
The deadline for submitting abstracts, papers and registration forms is February 15, 1998.

Contact address:
NM&A - O(h4)'98, c/o Dr. Oleg Iliev
Institute of Mathematics and Informatics
Bulgarian Academy of Sciences
Acad. G. Bonchev Str., Bl.8
1113 Sofia, BULGARIA
Fax: (+359 2) 971 36 49
email: nma98@math.acad.bg
http://banmatpc.math.acad.bg/ nma98/

HYDROINFORMATICS '98

Date: 24–26 August, 1998.

Location: Copenhagen, Denmark.

Organizer: The International Association for Hydraulic Research (IAHR).

Key–note lecturers: David Goldberg and Graham Thompson.

Topics:
- Data Acquisition and Analysis (SCADA, remote sensing, data modelling, data management and data-base technology).
- Advances in Numerical Methods and Techniques (advances in 1-, 2-, and 3-D computational hydraulics, water quality and ecological modelling, data assimilation, parameter estimation and process identification).
- Control Techniques and Decision Support (development and application of control techniques, model based control, uncertainty handling, decision support systems, distributed impact assessment and decision making: Internet and intranet).
- Experiences with standard software (case studies in coastal and estuarine processes, water resources/basin management, urban drainage systems, educational software - computer- aided learning).
- Emergent technologies (evolutionary algorithms, neural networks, fuzzy logic, distributed and decentralised simulation, object- and agent-orientation, data mining).

Other information:
A tutorial day will be held in conjunction to the Conference on Sunday, August 23, 1998, with the following topics:
- Evolutionary Algorithms
- Artificial Neural Networks
- Geographic Information Systems
- Computational Hydraulics
- Internet and Intranet
- Environmental Impact Assessment
- Data mining
- Ecological Simulations.

Contact address:
Hydroinformatics '98
Danish Hydraulic Institute
Agern Alle 5, DK-2970 Horsholm, Denmark
Tel.: +45 - 45 76 95 55
Fax: +45 - 45 76 25 67
email: HIC98@dhi.dk
http://www.dhi.dk/HIC98/Welcome.html

NUMERICAL METHODS AND COMPUTATIONAL MECHANICS

Date: 24–27 August, 1998.

Location: Miskolc, Hungary.

Organizers:
- Central European Association for Computational Mechanics
- Janos Bolyai Mathematical Society
- Hungarian Academy of Sciences
- University of Miskolc.

Aim and Scope:
The aim of the conference is to bring together numerical analysts of classical topics and specialists in computational mechanics who are interested in the development, implementation and application of advanced methods for reliable mathematical simulation of structural and mechanical

systems. Special attention will be given to the finite element method and related techniques.

Topics:

- Numerical Algebra (sparse and dense linear systems, eigenvalue problems, nonlinear systems, parallel algorithms, etc.).
- Numerical solution of differential equations (IVP and BVP, for ODEs and DAE, difference equations, FEM and BEM, multigrid, difference methods, spectral methods, parallel algorithms, etc.).
- Computational mechanics (FEM, BEM, Optimization, Parallel algorithms etc).

Invited speakers:

R.P. Agarwal, I. Babuska, C. Brezinsky, C. Broyden, Zs. Gáspár, M. Griebel, M. Kleiber, H. Mang, P. Neittaanmaki, P. Rózsa, E. Stein, B. Szab, W. Wendland.

Other information:

Authors who wish to present a 20–minute contributed lecture should submit a two–page abstract before April 30, 1998.

Contact address:

A.GALANTAI
Institute of Mathematics
University of Miskolc
3515 Miskolc-Egyetemvaros, Hungary
Tel.: 36-46-365-11
Fax: 36-46-365-174
email: nmcm98@gold.uni.miskolc.hu
http://www.uni-miskolc.hu:8080/home/nmcm98/conf98.html

International Conference on Functional Analysis, Partial Differential Equations and Applications

Date: 31 August – 4 September, 1998.

Location: Rostock, Germany.

Organizers:

The Department of Mathematics of the Rostock University and the Weierstrass-Institute for Applied Analysis and Stochastics (WIAS) Berlin.

Invited speakers:

I. Babushka (Austin, USA), E. Meister (Darmstadt), J. M. Ball (Oxford Un.), F. Murat (Paris), E. B. Dynkin (Ithaca, USA), P. E. Ricci (Rome), L. E. Fraenkel (Bath), Yu. G. Safarov (London), M. Giaquinta (Pisa), H. Triebel (Jena), I. Gohberg (Tel Aviv), D. G. Vassiliev (Brighton), D. Jerison (Cambridge, USA), M. I. Vishik (Moscow), T. Lyons (London), W. Wendland (Stuttgart).

Other information:

This conference will be held in honour of V. G. Mazya on the occasion of his 60th birthday.
The conference fee will be approximately 150 DM.

Contact address:

J. Romann
Universität Rostock, Fachbereich Mathematik
D-18051 Rostock, Germany
Tel.: (+49-) (381-) 498 1543
Fax: (+49-) (381-) 498 1520
email: juergen.rossmann@mathematik.uni-rostock.de
http://www.math.uni-rostock.de/math/events/FunctionalAnalsyis/

ACOMEN '98
An international conference on Advanced Computational Methods in Engineering

Date: 2–4 September, 1998.

Location: Ghent, Belgium.

Organizers:

R. Van Keer (Un. Ghent), B. Verhegghe (Un. Ghent), M. Hogge (Un. Liège).

Aim and Scope:

The aim of this conference is to bring together engineers and applied mathematicians involved in advanced computational methods applied to various engineering disciplines and to give them the possibility to present and discuss their latest results or simply to learn about the state-of-the-art in their own field of interest. The organizers want to provide a forum for researchers coming from universities, other research institutes and industrial R&D-groups. The organizers believe that mathematical modelling and numerical simulation is of continuously growing importance in engineering disciplines.

Topics:
The conference will focus on advanced computational methods, such as (adaptive) finite element and finite difference methods, boundary element methods, spectral methods and domain decomposition techniques, applied to direct and inverse problems in:
- Solid Mechanics
- Heat and Mass Transfer
- Environmental Engineering
- Fluid Dynamics.

Papers dealing with other engineering disciplines (e.g. electromagnetism) are welcomed too.

Other information:
The program of the conference will consist of
- about 7 invited lectures
- a few mini-symposia on specific topics
- contributed papers with oral presentation
- a software exhibition
- a poster session.

The deadline for submission of abstracts is December 1st, 1997.
The Participation fee is 300 USD (200 USD for students). A limited number of grants will be available for young researchers making evidence for need of financial support.

Contact address:
Ms. M. Botte
Department of Applied Mechanics RUG
Sint-Pietersnieuwstraat 41
B-9000 Gent, Belgium
Tel.: 32 9 264 34 30
Fax: 32 9 264 35 87
email: Martine.Botte@rug.ac.be
http://mecatrix.rug.ac.be/acomen98.html

HERCMA '98
4TH HELLENIC EUROPEAN CONFERENCE ON COMPUTER MATHEMATICS AND ITS APPLICATIONS

Date: 24–26 September, 1998.

Location: Athens, Greece.

Organizers:
Department of Informatics of AUEB and the Research Group for Advanced Computational Mathematics and Parallel Processing

Topics:
- Computational Mathematics
- High Performance Computing
- Operational Research and Statistics
- Mathematics in Economics and Industry.

Other information:
Abstracts for contributed talks and Minisymposia proposals must be submitted before February 20, 1998.
The registration fee is 200 USD (110 USD for students).

Conference language: English and Greek.

Contact address:
HERCMA '98 SECRETARIAT
Department of Informatics
Athens University of Economics & Business
76 Patision Street
Athens 104 34, Greece
Fax: + (3 01)- 8203 187
email: eal@aueb.gr
http://www.aueb.gr

MAFELAP 1999
TENTH CONFERENCE ON THE MATHEMATICS OF FINITE ELEMENTS AND APPLICATIONS

Date: 22–25 June, 1999.

Location: Brunel U., Uxbridge, Middlesex, U.K.

Scope:
The aim is to bring together again workers from different disciplines whose common interest is finite element methods, and to promote wider awareness throughout the finite element community of the latest developments in the field.

Topics:
- Theory and practice in finite elements
- Engineering and Scientific applications of FEM
- Adaptivity
- Parallel and vector processing
- CFD and structural mechanics
- Finite volume methods
- Boundary element methods
- Singularities
- Flow in porous media
- Financial mathematics.

Other information: The four-day programme will consist of: invited lectures, mini-symposia on specific areas, lectures in parallel sessions, and poster sessions.

Contact address:
The Secretary, MAFELAP 1999
BICOM, Brunel University
Uxbridge, UB8 3PH, U.K.
Tel.: (+44) 1895 203270
Fax: (+44) 1895 203303
email: mafelap@brunel.ac.uk
http://www.brunel.ac.uk/~icsrbicm/maflap99

3 Institutional reports and doctoral theses

DEPARTEMENT OF COMPUTER SCIENCE
K.U.LEUVEN
CELESTIJNENLAAN 200A
B-3001 HEVERLEE (LEUVEN), BELGIUM

Reports:

TW258. T. Michiels and J. Verschelde: Enumerating regular mixed-cell configurations .

TW259. R. Cools: The approximation of low-dimensional integrals: available tools and trends.

TW260. P. Verlinden: An asymptotic estimate of Hilb's type for generalized Jacobi polynomials on the unit circle.

TW261. M. Van Barel, V. Pták and Z. Vavrín Extending the notions of companion and infinite companion to matrix polynomials .

TW262. G. Uytterhoeven, F. Van Wulpen, M. Jansen, D. Roose and A. Bultheel: WAILI: Wavelets with integer lifting.

TW263. G. Uytterhoeven and D. Roose: Experiments with a wavelet-based approximate proper orthogonal decomposition.

TW264. M. Jansen, G. Uytterhoeven and A. Bultheel: WAILI: Image de-noising by integer wavelet transforms and generalized cross validation.

TW265. J. Verschelde: PHCPACK: A general-purpose solver for polynomial systems by homotopy continuation.

TW266. P. Kravanja and A. Haegemans: A modification of Newton's method for analytic mappings having multiple zeros.

INSTITUT FÜR ANGEWANDTE MATHEMATIK
DER UNIVERSITÄT BONN
SONDERFORSCHUNGSBEREICH 256
WEGELERSTR. 6
D - 53115 BONN

Reports:

494. Müller, Werner: Relative Zeta Functions, Relative Determinants and Scattering Theory.

495. Mosel, Heiko von der: Elastic Knots in Euclidean 3-Space.

496. Fuchs, Martin; Gongbao Li; Martio, Olli: Second Order Obstacle Problems for Vectorial Functions and Integrands With Subquadratic Growth.

497. Urbas, John: Complete Noncompact Self-Similar Solutions of Gauss Curvature Flows I. Positive Powers.

498. Elliott, Charles M.; Schätzle, Reiner; Stoth, Barbara: Viscosity Solutions of a Degenerate Parabolic Elliptic System Arising in the Mean Field Theory of Superconductivity.

499. Alt, Hans Wilhelm: An Evolution Principle and the Existence of Entropy. ODE Case.

500. Ebmeyer, Carsten; Frehse, Jens: Mixed Boundary Value Problems for Nonlinear Elliptic and Parabolic Equations in Non-Smooth Domains.

501. Oberknapp, Bernd; Polthier, Konrad: An Algorithm for Discrete Constant Mean Curvature Surfaces.

502. Fuchs, Martin; Osmolovski, Victor: Variational Integrals on Orlicz-Sobolev Spaces.

503. Urbas, John: Complete Noncompact Self-Similar Solutions of Gauss Curvature Flows II. Negative Powers.

504. Alt, Hans Wilhelm: An Evolution Principle and the Existence of Entropy. First Order Systems.

N16

NEWSLETTER ON COMPUTATIONAL AND APPLIED MATHEMATICS

Vol. 13., no. 3, November 1997

Contents